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| 10/015,931 | 12/08/2001 | Stephen W. Conant | 81600.911 | 2916 |

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| EXAMINER | |
|---|---|
| CHANG, JON CARLTON | |
| **ART UNIT** | **PAPER NUMBER** |
| 2623 | |

DATE MAILED: 02/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/015,931 | CONANT, STEPHEN W. | |
| | Examiner | Art Unit | |
| | Jon Chang | 2623 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,12,14,16 and 17* is/are rejected.

7)☒ Claim(s) *9-11,13,15 and 18-20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/4/02, 6/13/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

### *Claim Objections*

1. Claim 6 is objected to because of the following informalities:

In claim 6, line 9, the second occurrence of "of" should be deleted.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

2. Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 16 recites "said step of obtaining a plurality of numerical distributions". There is insufficient antecedent basis in the claim for this limitation.

### *Claim Rejections - 35 USC § 101*

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 1-5 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The claims merely recite manipulation of mathematical functions and/or values, and are not limited to a practical application. While the preamble of claim 1 recites "an interest point detector," a point is seen as merely a data value. Compare claim 1 to claim 6, the latter being limited to "processing image data" and including a step of

"obtaining image data..." Processing image data has a practical application as is known in the art.

In order to render the claims statutory, the examiner suggests the following:

1) amending the claim 1 to limit them to a practical application;

2) adding a limitation to add pre-mathematical processing activity (Such activity must involve acts to be performed to create data that will then be used in a process representing a practical application of one or more mathematical operations) or post-mathematical processing activity (Such activity must involve acts which represent some "significant use" of the solution.).

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-8, 12, 14 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by the article, "Eigenfaces for Recognition" by Turk et al. (hereinafter "Turk").

As to claim 1, Turk discloses a method for constructing an interest point detector comprising:

obtaining a set of encoding functions describing a plurality of data samples of a data set (page 74, paragraph beginning "Let the training..."; the encoding function are,

for example, $\Phi_i$; alternatively, the encoding functions are the eigenvectors $u_k$, i.e., the eigenfaces, on page 74);

obtaining a set of encoding factors associated with said set of encoding functions (the eigenvalues, defined by equation (1); alternatively the encoding factors are the M' eigenfaces, or the weights in equation (7), under "Using Eigenfaces to Classify a Face Image" on page 75, right column);

obtaining a plurality of numerical descriptors associated with said plurality of data samples by analyzing said set of encoding factors using a threshold criterion (page 75, right column, first paragraph; the numerical descriptors would be the M eigenvectors, M being the threshold, i.e., M would be the maximum number of eigenvectors used; alternatively, the numerical descriptors would be those pattern vectors $\Omega$ which are within the threshold $\theta_\epsilon$, under "Summary of Eigenface Recognition Procedure" steps 4 and 5 on page 76); and

obtaining a subset of numerical descriptors from said plurality of numerical descriptors by analyzing said plurality of numerical descriptors (page 75, right column, first two paragraphs under section "Using Eigenfaces to Classify a Face Image"; alternatively, those pattern vectors which result in images classified as unknown, under "Summary of Eigenface Recognition Procedure" steps 4 and 5 on page 76).

As to claim 2, Turk discloses the method of claim 1 wherein said data samples further comprise image data samples (see page 73, first paragraph under "Calculating Eigenfaces).

Regarding claim 3, Turk discloses the method of claim 1 wherein said set of encoding functions further comprises a set of basis functions (at least, the eigenvectors $\mathbf{u}_k$, i.e., the eigenfaces, are basis functions, e.g., note last paragraph in the right column of page 75).

Regarding claim 4, Turk discloses the method of claim 1 wherein said step of obtaining a set of encoding factors further comprises computing a set of encoding coefficients (considering the eigenvectors, $\mathbf{u}_k$ as the encoding functions, the eigenvalues, $\lambda_k$, page 74, are encoding coefficients) .

Regarding claim 5, Turk discloses the method of claim 1 wherein said step of obtaining a subset of numerical descriptors further comprises obtaining range criteria for selecting said subset of numerical descriptors from said plurality of numerical descriptors (page 76, step 5).

As to claim 6, Turk discloses a method for processing image data comprising:

obtaining image data for at least one image (e.g., the training set of face images, Fig.1(a));

obtaining a plurality image samples from said image data (the face images themselves within the training set);

producing a set of encoding functions for said at least one image (the encoding functions are the eigenvectors $\mathbf{u}_k$, i.e., the eigenfaces, on page 74);

extracting a set of encoding factors associated with said set of encoding functions for each one of said plurality of image samples (the encoding factors are the

M' eigenfaces, or the weights in equation (7), under "Using Eigenfaces to Classify a Face Image" on page 75, right column);

obtaining a plurality of target images by concatenating two sets or more of said set of encoding factors (page 7, last two paragraphs; each new face image to be classified is made up of a combination (a linear combination) of several eigenfaces, the eigenfaces being target images, and the combination being a concatenation);

obtaining a set of numerical descriptors using said set of encoding factors for each one of said plurality of target images (those pattern vectors which result in images classified, as belonging to a class or as unknown, under "Summary of Eigenface Recognition Procedure" steps 4 and 5 on page 76); and

obtaining an image object detector using said plurality of numerical descriptors from said at least one image (the result of images classified, under "Summary of Eigenface Recognition Procedure" steps 4 and 5 on page 76.).

Regarding claim 7, Turk discloses the method in claim 6 wherein said step of obtaining image data for at least one image further comprises obtaining digitized image data (note in "Calculating Eigenfaces," page 73, reference to "N by N array of (8-bit) intensity values" implies digitized image data).

As to claim 8, Turk discloses the method in claim 6 wherein said step of obtaining image data for at least one image further comprises convolving said image data with a numerical filter (on page 82, left column, "spatiotemporal filtering" involves spatial and temporal filtering. Spatial filtering is typically performed by convolving with a numerical filter).

As to claim 12, Turk discloses the method of claim 6 wherein said step of producing a set of encoding functions further comprises producing a set of basis functions (the eigenvectors $\mathbf{u}_k$, i.e., the eigenfaces, are basis functions, e.g., note last paragraph in the right column of page 75).

As to claim 14, Turk discloses the method of claim 6 wherein said plurality of encoding factors further comprises a plurality of encoding coefficients (the eigenvalues, $\lambda_k$, page 74, are encoding coefficients).

As to claim 17, Turk discloses the method of claim 6 wherein said step of obtaining a plurality of numerical distributions further comprises computing a set of boundaries for selecting from said plurality of numerical descriptors (the distance is inferred by the threshold distance, steps 4 and 5, under "Summary of Eigenface Recognition Procedure"; if the distance to a class is less then the threshold, i.e., within the boundary, the patter vector as classified in that class).

7. Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by "Digital Image Processing" by Gonzalez et al. (hereinafter "Gonzalez").

As to claim 1, Gonzalez discloses a method for constructing an interest point detector comprising:

obtaining a set of encoding functions describing a plurality of data samples of a data set (section 6.5.2, pages 374-377; the basis images h or H);

obtaining a set of encoding factors associated with said set of encoding functions (the weighting coefficients, T);

obtaining a plurality of numerical descriptors associated with said plurality of data samples by analyzing said set of encoding factors using a threshold criterion (the truncated coefficients resulting from threshold coding, top half of page 378, and page 385 to top of page 386); and

obtaining a subset of numerical descriptors from said plurality of numerical descriptors by analyzing said plurality of numerical descriptors (the results of quantization, Fig.6.28, and page 381, under "Bit Allocation"; quantization results in some coefficients having zero value, which are discarded).

As to claim 2, Gonzalez discloses the method of claim 1 wherein said data samples further comprise image data samples (see first paragraph of section 6.5.2).

Regarding claim 3, Gonzalez discloses the method of claim 1 wherein said set of encoding functions further comprises a set of basis functions (page 377, the basis images).

Regarding claim 4, Gonzalez discloses the method of claim 1 wherein said step of obtaining a set of encoding factors further comprises computing a set of encoding coefficients (page 377, the weighting coefficients).

Regarding claim 5, Gonzalez discloses the method of claim 1 wherein said step of obtaining a subset of numerical descriptors further comprises obtaining range criteria for selecting said subset of numerical descriptors from said plurality of numerical descriptors (quantization inherently involves ranges to which the coefficients are quantized.).

### *Allowable Subject Matter*

8. Claims 9-11, 13, 15 and 18-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. Claim 16 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

### *References Cited*

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 5,915,034 to Nakajima et al. discloses a pattern collation apparatus which utilizes the two-dimensional discrete Fourier transform. The transform involves encoding functions and coefficients.

### *Contact Information*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jon Chang whose telephone number is (703)305-8439. The examiner can normally be reached on M-F 8:00 a.m.-6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703)308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jon Chang
Primary Examiner
Art Unit 2623

Jon Chang
February 22, 2005